

Hengameh Bagherian, CV

Theoretical Particle Physics and Cosmology

© 933 E 56th St, Chicago, IL 60637, USA ✉ hengameh@uchicago.edu ☎ (+1) 617 710 - 7057

Education

Ph.D. , Dep. of Physics, <i>Harvard University</i> , Cambridge, MA	2025
Advisor: Prof. Matthew Reece	
M.A. , Dep. of Physics, <i>Harvard University</i> , Cambridge, MA	2021
B.Sc. , Dep. of Physics, <i>Massachusetts Institute of Technology</i> , Cambridge, MA Minor: Mathematics	2019

Appointments

NSF Pstdoctoral Fellow, <i>University of Chicago</i> , Chicago IL High Energy Particle Theory and Cosmology	Current
Pstdoctoral Fellow, <i>Harvard University</i> , Cambridge MA High Energy Particle Theory and Cosmology	Summer 2025
Summer Researcher, <i>University of Regensburg</i> , Germany Lattice QCD	2019
Summer Researcher, <i>Institute for Quantum Computing</i> , Canada Quantum Computing	2017

Publications

- [1] Pouya Asadi, Hengameh Bagherian, Katherine Fraser, Samuel Homiller, Qianshu Lu “*Lepton Flavor Violation: From Muon Decays to Muon Colliders*,” Under PRD Review ([arXiv:2509.22771 \[hep-ph\]](https://arxiv.org/abs/2509.22771))
- [2] Hengameh Bagherian, Majid Ekhterachian, Stefan Stelzl “*The Bearable Inhomogeneity of the Baryon Asymmetry*,” Under JHEP Review ([arXiv:2505.15904 \[hep-ph\]](https://arxiv.org/abs/2505.15904))
- [3] Daniel Aloni, Hengameh Bagherian, Rashmish K. Mishra “*Evaporating Axion Dark Matter and the Hubble Parameter*,” Under PRL Review ([arXiv:2409.13807 \[hep-ph\]](https://arxiv.org/abs/2409.13807))
- [4] Hengameh Bagherian, Melissa Joseph, Martin Schmaltz, Eashwar Sivarajan, “*Stepping into the Forest: Confronting Interacting Radiation Models for the Hubble Tension with Lyman-a Data*,” *Phys.Rev.D* 111 (2025) 4, 043513 ([arXiv:2405.17554 \[astro-ph.CO\]](https://arxiv.org/abs/2405.17554))
- [5] Hengameh Bagherian, Katie Fraser, Samuel Homiller, John Stout, “*Zero Modes of Massive Fermions Delocalize from Axion Strings*,” *JHEP* 05 (2024) 079 ([arXiv:2310.01476 \[hep-th\]](https://arxiv.org/abs/2310.01476))
- [6] Hengameh Bagherian, Matthew Reece, Linda Xu, “*The Inflated Chern-Simons Number in Spectator Chromo-Natural Inflation*,” *JHEP* 01 (2023) 099 ([arXiv:2207.11262 \[hep-th\]](https://arxiv.org/abs/2207.11262))
- [7] Hengameh Bagherian, Scott Skirlo, Yicen Shen, Huaiu Meng, Vladimir Ceperic, Marin Soljačić, “*On-Chip Optical Convolutional Neural Networks*,” [arXiv:1808.03303 \[cs.ET\]](https://arxiv.org/abs/1808.03303)

Works in Progress

- [1] Hengameh Bagherian, Matthew Reece, Lian-Tao Wang, Huangyu Xiao, “*Birefringence Signal & the Quality Problem of ALP Dark Energy Solutions*”
- [2] Hengameh Bagherian, Azadeh Maleknejad, “*Gravitational Particle Production in deSitter: 1-Loop Corrections to Fermion Self Energy*”

Awards

Postdoctoral Research Fellowship Recipient , National Science Foundation (NSF) Mathematical and Physical Sciences Ascending Postdoctoral Fellows (MPS-Ascend)	August 2025 - July 2028
Honorable Mention , National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP)	April 2021

Neekeyfar Fund Award Recipient , Harvard University	Sep. 2019
Honorable Mention , National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP)	April 2019
Patent , "Optical Ising Machines and Optical Convolutional Neural Networks," U.S. Patent No. 11,017,309	May 2021
Silver Medalist , Iranian National Physics Olympiad	Summer 2013 Tehran, Iran

Invited Talks & Seminars

Cosmological Aspect of Axion-Monopole Interactions

- The Great Lakes BSM Workshop Dec. 02, 2025

The Unbearable Inhomogeneity of Baryogenesis

- Argonne National Laboratory – Seminar Nov. 11, 2025
- Perimeter Institute – Seminar Oct. 28, 2025
- University of Notre Dame – Seminar Sep. 30, 2025
- Brown University – IDEAS Seminar May 14, 2025

Interacting Dark Radiation and Cosmological Tensions

- Oxford University – Dalitz Seminar Mar. 06, 2025
- Kings College London – Seminar Mar. 12, 2025
- California Institute of Technology (Caltech) – Particle Physics Joint Seminar Nov. 20, 2024
- University of California, Irvine – Astrophysics Seminar Nov. 19, 2024
- University of Chicago – Particle Theory Seminar Nov. 13, 2024

Constraining Interacting Dark Radiation with Lyman- α

- Northwestern University – Particle Theory Seminar Oct. 18, 2024
- Lawrence Berkeley National Laboratory (LBNL) – Particle Theory Seminar April 10, 2024
- Stanford University – Particle Theory Seminar April 05, 2024
- Boston University – Particle Theory Seminar April 03, 2024

"Zero Modes From Axion Strings And Massive Fermions"

- SLAC National Laboratory – Particle Theory Seminar April 12, 2024
- CERN – Cosmo Coffee Hour June 21, 2023
- University of Geneva – Particle Theory Group Seminar June 20, 2023
- University of Geneva – Cosmology and Astrophysics Group Seminar June 09, 2023

Other Talks & Posters

- PIKIMO (Phenomenology in Indiana, Kentucky, Illinois, Michigan, and Ohio)
Parallel Talk – "The Unbearable Inhomogeneity of Baryogenesis" Nov. 08, 2025
- KICP at University of Chicago
30 min Pizza Talk – "Constraining Interacting Dark Radiation with Lyman- α " Oct. 15, 2024
- Fermi National Laboratory (Fermilab) – Inaugural US Muon Collider Meeting
Poster – "Lepton Flavor Violation: From Muon Decays to Muon Colliders" Aug. 7th, 2024
- Theoretical Advanced Study Institute (TASI) Summer School
Student Talk – "Constraining Interacting Dark Radiation with Lyman- α " June 26, 2024
- LBNL – Fundamental Physics from Future Spectroscopic Surveys Workshop
Parallel Talk – "Constraining Interacting Dark Radiation with Lyman- α " May 08, 2024
- Harvard University – Particle Theory Lunch Seminar
"Constraining Interacting Dark Radiation with Lyman- α " March 22, 2024
- Harvard University – Particle Theory Lunch Seminar
"Zero Modes From Axion Strings And Massive Fermions" Nov. 09, 2023
- University of Pittsburgh – The 2023 Phenomenology Symposium (Pheno)
May 09, 2023

Parallel Talk – “The Inflated Chern-Simons Number in Spectator Chromo-Natural Inflation”	
• Massachusetts Institute of Technology – MIT 10 min Lightning Talks “The Inflated Chern-Simons Number in Spectator Chromo-Natural Inflation”	Feb. 05, 2023
• Cargese Summer School Student Talk – “The Inflated Chern-Simons Number in Spectator Chromo-Natural Inflation”	Aug. 05, 2022
• Harvard University – Particle Theory Lunch Seminar “The Inflated Chern-Simons Number in Spectator Chromo-Natural Inflation”	April 06, 2022

Teaching Experience

Graduate Teaching Fellow , Harvard University	Spring 2025
PHYSICS 232: Advanced Electromagnetism, <i>Prof. Sonia Paban</i>	
Graduate Teaching Fellow , Harvard University	Spring 2024
PHYSICS 254: The Standard Model, <i>Prof. Matthew Reece</i>	
Graduate Teaching Fellow , Harvard University	Spring 2023
PHYSICS 232: Advanced Electromagnetism, <i>Prof. Girma Hailu</i>	
Graduate Teaching Fellow , Harvard University	Fall 2021
PHYSICS 251A: Advanced Quantum Mechanics I, <i>Prof. Matthew Reece</i>	
Undergraduate Teaching Fellow , Harvard University	Fall 2020
Physical Sciences 2: Mechanics, Elasticity, Fluids, and Diffusion, <i>Dr. Greg Kestin & Dr. Louis Deslauriers</i>	

Workshops and Summer Schools

Inaugural US Muon Collider Meeting : Fermi National Laboratory	07 - 09 Aug. 2024 Batavia, IL
Theoretical Advanced Study Institute (TASI) Summer School : The Frontiers of Particle Theory	03 - 28 June 2024 Boulder, CO
Fundamental Physics from Future Spectroscopic Surveys Workshop : Lawrence Berkeley National Laboratory	06 - 08 May 2024 Berkeley, CA
Galileo Galilei Institute Winter School : GGI Lectures on the Theory of Fundamental Interactions	08 - 26 Jan 2024 Florence, Italy
Galileo Galilei Institute Workshop : Axions Across Boundaries Between Particle Physics, Astrophysics, Cosmology and Forefront Detection Technologies	26 April - 09 June 2023 Florence, Italy
Institut d'Etudes Scientifiques de Cargese Summer School : Rethinking Beyond the Standard Model	25 July - 6 Aug 2022 Corsica, France
ICTP Summer School : Summer School on Particle Physics	31 May - 11 June 2021 Trieste, Italy
Institute for Quantum Computing Summer School : The Undergraduate School on Experimental Quantum Information Processing	Summer 2017 Waterloo, Canada

Community and Outreach

Co-Chair – Women and Gender Minorities in Physics (GWiP) , Harvard University	2023 - Present
Organizer – HETG BSM Journal Club , Harvard University	Fall 2023
Organizer – Particle Theory Lunch Seminar , Harvard University	Fall 2022
President – Harvard Iranian Student Association , Harvard University	2021 - 2022
Volunteer Mentor – Polaris Mentoring Program , Harvard University	2019 - Present
Volunteer Mentor – Science Club For Girls (SCFG) , Cambridge, MA	2019 - 2020
SCFG is a nonprofit organization that addresses inequities in STEM around race, gender, and socioeconomic status.	